Preventive Medicine 34, 476–484 (2002)
doi:10.1006/pmed.2001.0996, available online at http://www.idealibrary.com on IDEAL®

Peer Influences and Access to Cigarettes as Correlates of Adolescent Smoking: A Cross-Cultural Comparison of Wuhan, China, and California[1]

Jennifer B. Unger, Ph.D.,*[,2] Li Yan, M.D.,† Sohaila Shakib, Ph.D.,* Louise Ann Rohrbach, Ph.D.,* Xinguang Chen, Ph.D.,* Guo Qian, M.D.,† Chih-Ping Chou, Ph.D.,* Shan Jianguo, M.D.,† Stanley Azen, Ph.D.,* Hong Zheng, M.A.,* and C. Anderson Johnson, Ph.D.*

*University of Southern California, Los Angeles, California 90089; and †Wuhan Public Health and Anti-Epidemic Station, Wuhan, China

Background. **Few studies have assessed the effects of access to cigarettes and peer influences on adolescent smoking in non-Western countries. Using samples characterized by two distinct cultural, social, and economic systems, this study evaluated the associations of friends' smoking and perceived access to cigarettes with adolescent smoking behavior in California and Wuhan, China.**

Methods. **Survey data were obtained from 5870 eighth-grade students in the Independent Evaluation of the California Tobacco Control Program and 6992 seventh- to ninth-grade students in the Wuhan Smoking Prevention Trial. Odds ratios for lifetime and 30-day smoking, according to friends' smoking and perceived access to cigarettes, were calculated for boys and girls in both samples and compared.**

Results. **California students were more likely than Wuhan students to have friends who smoked and to perceive easy access to cigarettes. The smoking prevalence was lower in Wuhan than in California, mainly due to the low smoking prevalence among Wuhan girls. Friends' smoking was strongly associated with smoking in both samples, and the strength of this association did not differ between the two cultures. Access to cigarettes was associated with a higher risk of lifetime smoking in both cultures and a higher risk of past 30-day smoking in California only.**

Conclusions. **Despite divergent tobacco control policy enforcement, social structures, and cultural contexts, similarities exist between Wuhan and California. The findings suggest support for adapting a social-influences-based smoking prevention program developed in the United States to the culturally specific needs of youth in Wuhan, China.** © 2002 American Health Foundation and Elsevier Science (USA)

INTRODUCTION

Reducing the Number of Smokers in China: An Important Public Health Objective

Currently, over 300 million smokers inhabit China, consuming one of every three cigarettes manufactured in the world [*1*]. Although smoking is considered a fashion statement among some of China's young and elite [*2*], smoking pervades many sectors of the population, as 63% of adult men, the majority of adult males in China, reported smoking [*3*]. Current smoking prevalence among adolescents indicates that smoking will continue to be a normative behavior in the near future, particularly among males. Among adolescents, between 28 and 43% of males and 1 and 11% of females in China identified themselves as smokers [*4–8*]. Because the average age of smoking initiation in China is decreasing rapidly [*3*], smoking prevention efforts targeted to adolescents have been identified as an important tool for reducing the burden of future tobacco-related morbidity and mortality in China [*9*].

Value of Comparing and Contrasting Chinese and U.S. Risk Factors for Prevention Efforts

The most systematic investigations of adolescent smoking prevention strategies have been developed

[1] This study was supported by the National Cancer Institute/National Institute of Drug Abuse Transdisciplinary Tobacco Use Research Center Grant 1 P50 CA84735-01 awarded to the University of Southern California. Support for the Wuhan Smoking Prevention Trial also was provided by the Wuhan Public Health and Anti-Epidemic Station, the Wuhan Public Health Bureau, and the University of Southern California. California data were collected as part of the Independent Evaluation of the California Tobacco Control, Prevention, and Education Program, with funds received from the Tobacco Tax Health Protection Act of 1988-Proposition 99, under Grant 95-22998, with the California Department of Health Services, Tobacco Control Section. The analyses, interpretations, and conclusions reached in this paper are those of the authors, not the California Department of Health Services or the Wuhan government.

[2] To whom correspondence and reprint requests should be addressed at USC Institute for Prevention Research, 1000 S. Fremont, Box 8, Alhambra, CA. Fax: (626) 457-4012. E-mail: unger@hsc.usc.edu.

0091-7435/02 $35.00
© 2002 American Health Foundation and Elsevier Science (USA)
All rights reserved.

PM3003745791

Source: https://www.industrydocuments.ucsf.edu/docs/mqlj0001

with samples from the United States and other Western countries [*10, 11*]. However, if the antecedents of adolescent smoking differ across cultures, prevention strategies developed in the United States and other Western countries might not be effective in countries with vastly different cultural and societal contexts, such as China. The Wuhan Public Health and Anti-Epidemic Station has partnered with the University of Southern California, Department of Preventive Medicine, to develop evidence-based and culturally relevant adolescent smoking prevention strategies in Wuhan, China [*12*]. The goal of this study is to understand the relevance of state-of-the-art prevention science developed in a Western context to Wuhan, China. The two nations are characterized by distinct cultural and social systems and enforcement of tobacco control policies. Using samples from Wuhan, China, and the state of California, this study compares and contrasts the relative importance of two important risk factors associated with U.S. adolescent smoking prevention efforts [*13*].

Access to Tobacco

Access to tobacco is a prerequisite for adolescent smoking to occur. Wuhan adolescents may have easier access to cigarettes than California adolescents for several reasons. First, California has implemented and enforced some of the country's (and the world's) strictest policies prohibiting over-the-counter tobacco sales to youth, including imposing substantial fines on merchants who sell tobacco to youth and "sting" operations to detect merchants who do not check identification [*14–16*]. Additionally, California has policies restricting locations of cigarette vending machines in public spaces and cigarette packages in retail stores [*15*]. Similar policies exist in Wuhan, but they are not strictly enforced or publicized. In fact, in a recent pilot survey of parents of 7th- and 11th-grade adolescents in Wuhan, only 23% of the parents were aware that Wuhan had a law prohibiting the sale of cigarettes to adolescents (C. A. Johnson, personal communication, October 19, 2001). Second, because purchasing cigarettes for parents is considered normative in China [*6*], Wuhan youth may have opportunities to practice purchasing over-the-counter cigarettes for themselves. Third, although higher cigarette prices due to California tobacco taxes [*14–16*] and a lack of spending money among Wuhan youth may limit access for both groups of adolescents, Wuhan youth may have increased access to cigarettes from social sources, as it is customary to give cigarettes as gifts for special occasions [*6*]. Fourth, because more Chinese (63% of males; 4% of females) [*3*] than California (18% of males; 14% of females) [*17*] adults are current smokers, Wuhan youth might have more opportunities to interact with adult smokers and obtain cigarettes from them. Further, female-headed households are less common and extended family structures are more common in China; this may increase the risk that a Wuhan adolescent lives with a smoker (usually an adult male).

Peer Influences

Numerous studies in the United States have identified peer influence as one of the strongest determinants of adolescent smoking [*19–21*]. Research conducted in Beijing [*8*] suggests support for the importance of peer influences on adolescent smoking in Chinese culture as well. In addition, industrialization historically has coincided with increases in time spent with and identification with same-age peers for adolescents [*22*]. China's current industrializing expansion efforts therefore suggest that the peer group may be an important reference group for adolescent smokers in Wuhan [23].

There is reason to suspect that peer influences may be a weaker influence on adolescent smoking in Wuhan than in the United States. The divergent cultures and differing social, economic, and institutional patterns, suggest that the importance of identifying with the adolescent peer group may not be as strong in China [*22*]. The United States is an individualistic, capitalist society with social norms and a youth culture that reward adolescents for rebelling against authority figures and identifying with the peer group. The strong cultural value of filial piety in China, in contrast, labels adolescent rebellion as shameful to the entire family. Additionally, the greater cultural heterogeneity in U.S. than Chinese society may reduce youth's trust for parents as a reference group for social norms; parents may not possess all the knowledge, skills, and resources to teach an adolescent to function in a complex, multicultural society. The increased salience of peer associations in the United States has paralleled immigration patterns and is hypothesized to result from a need to negotiate the complex norms and values of the diverse, rapidly changing adolescent culture [*24, 25*].

Hypotheses

Before developing culturally appropriate smoking prevention strategies for China based upon prevention efforts with U.S. and other Western samples, it is necessary to gain an improved understanding of the similarities and differences in risk factors for adolescent smoking in China compared with Western countries. The goal of this study was to determine and compare the relative importance of peer influences and access to tobacco for adolescent smoking uptake in Wuhan, China, and California, two areas in which widespread smoking prevention programs and tobacco control policies are being implemented. We hypothesized that both access and peer influences would be significantly associated with an increased risk for adolescent smoking in Wuhan and California. However, because of

PM3003745792

Source: https://www.industrydocuments.ucsf.edu/docs/mqlj0001

differing tobacco control policy enforcement, social structures, and cultural contexts, the relative strength of significance of access and peer influence might vary across samples.

METHODS

Data Sources

California data were obtained from a representative sample of eighth-grade California youth (N = 5,870). The data were collected in schools in 18 California counties within four sampling strata, and the sample was weighted to represent the population of California youth. The data were collected during the 1996–1997 school year as part of the Independent Evaluation of the California Tobacco Control, Prevention, and Education Program [*14*]. The data were collected by trained health educators using paper-and-pencil surveys in California classrooms. Because the survey was anonymous, the university's Institutional Review Board authorized an implied parental consent procedure. Consent forms were sent to parents of all students in the selected classrooms. Parents were instructed to sign and return the consent form only if they refused their child permission to participate. Students were allowed to decline participation at any time. Of the students invited to participate, 96% completed the survey. The remaining 4% did not complete the survey because either they or their parents refused participation.

Data from Wuhan, China, were obtained from a sample of 6,992 seventh- to ninth-grade students. The data reported here are from the baseline survey of a longitudinal school-based smoking prevention program currently being implemented throughout the urban and rural areas of Wuhan, China [*12*]. The data collection procedures were approved by Institutional Review Boards in Wuhan and the United States. The sample consisted of students attending seventh, eighth, or ninth grades in 22 schools in the Wuhan metropolitan or surrounding rural area. The Wuhan metropolitan area consists of three geographic regions: Hankou (a commercial region), Hanyang (an industrial region), and Wuchang (a cultural or scholastic region defined as such because of its educational facilities), as well as four rural counties. The urban regions are divided further into seven administrative districts. Two schools were randomly selected from each of the seven urban districts and four rural counties, and six classes in each of the selected schools were randomly selected for data collection. A total of 7,127 students were invited to participate in December 1998: 4,792 seventh graders, 1,172 eighth graders, and 1,163 ninth graders. Of the 7,127 students invited to participate, 56 (1%) did not provide parental consent, and 77 (1%) were absent from school on the day of data collection. Two surveys were discarded because they were duplicates. This analysis reports the results for the remaining 6,992 students (98% of those invited to participate).

Measures

The measures used in the California survey had been developed and validated in previous studies [*15*]. Questions from the California survey, as well as other validated adolescent smoking surveys, were translated into Chinese for inclusion on the Wuhan survey. To ensure equivalence of meaning across the surveys, all questions were translated from English to Chinese and then backtranslated from Chinese to English by bilingual public health research staff (including a linguist from China now living in the United States). The research team carefully evaluated the Chinese and English versions of each question to ensure that the connotations of the questions were equivalent. The Chinese version of the questionnaire was pilot-tested with small groups of adolescents in Wuhan to identify any potential wording ambiguities.

Best friends' smoking. In the California sample, respondents were asked, "How many of your best friends smoke cigarettes?" Responses were rated on a 4-point scale: "none," "a few," "some," or "a lot." Respondents who answered "a few," "some," or "a lot" were coded as having friends who smoked. In the Wuhan sample, two friends' smoking questions were asked, one for male friends and one for female friends. The questions asked, "Among your best friends who are boys (girls), how many smoke?" Responses were rated on a 13-point scale ranging from "0" to "12 or more." Respondents who indicated that any of their male friends or female friends smoked were coded as having friends who smoked. Because the questions about friends' smoking were slightly different in the two questionnaires, they were recoded to a dichotomous variable representing the presence of any friends who were smokers.

Perceived access to cigarettes. Respondents in both samples were asked, "Do you think it would be easy or hard for you to get cigarettes if you wanted some?" Responses were rated on a four-point scale: "very hard," "sort of hard," "sort of easy," and "very easy." Because of concern about the equivalence of the terms "very" and "sort of" across the two languages, this item was recoded to a dichotomous measure: "very" or "sort of" hard vs "very" or "sort of" easy.

Lifetime smoking prevalence. In both samples, respondents were asked, "Have you ever tried cigarette smoking, even a few puffs?" Respondents answered "yes" or "no."

Thirty-day smoking prevalence. In both samples, respondents were asked, "Think about the last 30 days. On how many of these days did you smoke cigarettes?" Responses were coded on a seven-point scale ranging

PM3003745793

Source: https://www.industrydocuments.ucsf.edu/docs/mqlj0001

from "0 days" to "all 30 days". Because the distributions were nonnormal (California: skewness = 3.04; kurtosis = 8.74; Wuhan: skewness = 5.19; kurtosis = 30.12), responses were recoded as 0 days vs 1 or more days. The practice of dichotomizing the past-30-day smoking measure in adolescent surveys is followed in most U.S.-based adolescent smoking prevalence surveys [*14, 15*]. However, another possible strategy is to keep the measure continuous and use a logarithmic transformation to reduce the skewness. In this paper, the analyses were performed with the variable coded each way—dichotomized and continuous with a logarithmic transformation.

Data Analysis

χ^2 analyses were used to assess gender differences and between-country differences in the prevalence of lifetime smoking, 30-day smoking, friends' smoking, and perceived access to cigarettes. Because a significant χ^2 in a large sample might not indicate a clinically important effect, the phi coefficient was calculated as a measure of effect size.

Multivariate logistic regression analyses were used to assess the odds of lifetime smoking and past-30-day smoking, according to friends' smoking and perceived access. Odds ratios and 95% confidence intervals were calculated separately for California boys, California girls, Wuhan boys, and Wuhan girls.

Dichotomized vs Continuous Coding of past-30-day smoking. The analyses described above regard past-30-day smoking as a dichotomous variable (1 = smoked in the past 30 days; 0 = did not smoke in the past 30 days). Although dichotomizing the past-30-day smoking variable is one way to handle the skewness of its distribution, another option is to apply a logarithmic transformation to the original continuous variable. To determine whether the results would remain consistent if the 30-day smoking variable were not dichotomized, the continuous variable was log-transformed, and linear regression was used to test the model above with the log-transformed, continuous 30-day smoking variable as the dependent variable.

Rationale for including age as a covariate. The prevalence of adolescent smoking has been found to increase significantly by age, both in this California sample [*14, 15*] and in this Wuhan sample [*12*]. Age also might be associated with easier access to cigarettes (i.e., adolescents who appear older might be able to buy cigarettes more easily) and with friends' smoking (i.e., older adolescents may affiliate with older, higher risk peer groups). Preliminary analyses for this study revealed that in both samples, the respondents who had tried smoking (California $t = 9.96$, $P < 0.0005$; Wuhan $t = 4.38$, $P < 0.0005$), had friends who smoked (California $t = 8.20$, $P < 0.0005$; Wuhan $t = 8.62$, $P < 0.0005$), and had access to cigarettes (California $t = 7.41$, $P < 0.0005$; Wuhan $t = 10.52$, $P < 0.0005$) were significantly older than were those who did not. Because age might confound the associations between the predictor variables and smoking, age was included as a covariate in the logistic regression models.

Interactions. The analyses described above were conducted separately for each of four groups: California boys, California girls, Wuhan boys, and Wuhan girls. This was done to obtain separate odds ratios for each group and because the measures and sampling strategies differed between California and Wuhan. Every effort was made to make the measures equivalent in meaning, but it is impossible to do a word-by-word literal translation from English to Chinese because of the structural differences between the two languages. However, to determine whether the odds ratios differed significantly across groups, it was necessary to pool the two samples and examine the interactions of the independent variables with country and gender. A final logistic regression was performed using the combined sample, with main effects of friends' smoking, perceived access, gender, and country, and interaction terms of friends' smoking × country, friends' smoking × gender, perceived access × country, and perceived access × gender. The predictors were entered into the regression model in a two-step process: first the set of main effects and then the set of interaction terms.

RESULTS

The demographic characteristics of the two samples are shown in Table 1. The mean age of the respondents in the two samples was similar (13.21 years in California, 13.17 years in Wuhan), but there was more variance in age in the Wuhan sample. This reflects the fact that the Wuhan sample included seventh, eighth, and ninth-grade students, while the California sample included only eighth-grade students. Both samples consisted of approximately equal numbers of males and females.

Cross-Cultural and Gender Differences in Smoking Behavior and Psychosocial Variables

Table 2 shows the prevalence of lifetime smoking, 30-day smoking, friends' smoking, and perceived access to cigarettes among boys and girls in the two samples.

Cross-cultural differences. As shown in Table 2, California adolescents were significantly more likely than Wuhan adolescents ever to have tried smoking, to have smoked in the past 30 days, to have friends who smoked, and to perceive that they had easy access to cigarettes. The cross-cultural differences were due mainly to the low rates among Wuhan girls.

PM3003745794

Source: https://www.industrydocuments.ucsf.edu/docs/mqlj0001

TABLE 1

Demographic Characteristics of Respondents

	California (n = 5,870) (%)	Wuhan (n = 6,992) (%)	Test of between-country differences
Age			
Mean (SD)	13.21 (0.55)	13.17 (1.04)	t = 2.84*
Gender			
Male	50	53	χ^2 = 10.1*
Female	50	47	
Ethnicity			
Asian/Pacific Islander	15	100	χ^2 = 9778.5*
African American	8	0	
Latino/Hispanic	22	0	
White	33	0	
Other	8	0	
Multiethnic	14	0	

*$P < 0.05$.

Gender differences. In Wuhan, boys were more likely than girls to have tried smoking, to have smoked in the past 30 days, to have friends who smoked, and to have easy access to cigarettes. In California, similar gender differences were evident for lifetime smoking, friends' smoking, and perceived access to cigarettes, but not for 30-day smoking.

Associations between Friends' Smoking and Smoking Behavior

Table 3 shows the odds ratios for lifetime smoking and 30-day smoking, according to friends' smoking and perceived access. Among California and Wuhan boys and girls, students who had friends who smoked were at increased risk of lifetime smoking and 30-day smoking. In general, students who had friends who smoked were approximately 4 to 6 times more likely ever to have tried smoking and 7 to 14 times more likely to have smoked in the past 30 days, compared to their peers who did not have friends who smoked.

Associations between Perceived Access and Smoking Behavior

Lifetime smoking. As shown in Table 3, access to cigarettes was associated with an increased risk of lifetime smoking in both samples. The odds ratios associated with perceived access were not as large as the odds ratios for friends' smoking, but they were all statistically significant.

Past-30-day smoking. In the logistic regression model (Table 3), access to cigarettes was associated significantly with an increased risk of past-30-day smoking in California but not in Wuhan. In the linear regression model with past-30-day smoking modeled as a log-transformed continuous variable (Table 4), the results were similar.

Interactions

Table 5 shows the results of the overall logistic regression model. In this model, the interaction terms of each predictor variable × country and each predictor variable × gender were entered into the model hierarchically, after the main effects. As shown in Table 5, the associations between friends' smoking and the respondents' smoking were stronger among girls than among boys (indicated by the odds ratios >1 for the friends' smoking × female interaction term). The effect of access on smoking behavior also was stronger among girls than among boys, but this interaction term was significant only for lifetime smoking (the access × fe-

TABLE 2

Smoking Behavior and Related Psychosocial Variables among California and Wuhan Boys and Girls

	California boys	California girls	Wuhan boys	Wuhan girls	California vs Wuhan comparison	Gender difference in California	Gender difference in Wuhan
Lifetime smoking (%)	48	45	46	18	χ^2 = 241.5*, phi = 0.14	χ^2 = 7.7*, phi = 0.04	χ^2 = 622.6*, phi = 0.30
30-day smoking (%)	18	18	14	3	χ^2 = 232.2*, phi = 0.13	χ^2 = 0.1, phi = 0.00	χ^2 = 241.1*, phi = 0.19
Have friends who smoke (%)	51	56	33	17	χ^2 = 1056.2*, phi = 0.29	χ^2 = 12.8*, phi = 0.05	χ^2 = 228.5*, phi = 0.18
Easy access to cigarettes (%)	72	66	42	38	χ^2 = 1048.6*, phi = 0.28	χ^2 = 19.1*, phi = 0.06	χ^2 = 10.3*, phi = 0.04

*$P < 0.05$.

PM3003745795

Source: https://www.industrydocuments.ucsf.edu/docs/mqlj0001

TABLE 3

Odds Ratios for Smoking Behavior, According to Friends' Smoking and Perceived Access to Cigarettes

	Lifetime smoking		Past-30-day smoking	
	OR	95% CI	OR	95% CI
California boys				
Friends' smoking	4.40*	(3.74, 5.18)	5.85*	(4.55, 7.52)
Access to cigarettes	2.66*	(2.20, 3.21)	2.42*	(1.80, 3.24)
California girls				
Friends' smoking	4.73*	(3.99, 5.60)	11.65*	(8.30, 16.36)
Access to cigarettes	2.13*	(1.78, 2.55)	1.87*	(1.44, 2.42)
Wuhan boys				
Friends' smoking	4.75*	(4.08, 5.53)	6.66*	(5.41, 8.20)
Access to cigarettes	1.40*	(1.22, 1.62)	1.23	(1.00, 1.50)
Wuhan girls				
Friends' smoking	3.71*	(3.02, 4.56)	8.63*	(5.80, 12.86)
Access to cigarettes	2.18*	(1.81, 2.63)	1.31	(0.89, 1.95)

Note. Odds ratios are age-adjusted.
* $P < 0.05$.

male interaction term). The strength of the association between friends' smoking and the respondents' smoking behavior did not differ significantly between California and Wuhan (indicated by the nonsignificant odds ratios for the friends' smoking × Wuhan interaction terms). However, the between-country differences in the associations between access and respondents' smoking were significant; the access × Wuhan interaction terms <1 indicate that this association was stronger in California than in Wuhan.

DISCUSSION

This study investigates the similarities and differences among risk factors for adolescent smoking in Wuhan, China, and California. The results of this analysis indicate that despite differences in cultures, social systems, and the enforcement of tobacco control policies, considerable similarities in the relative importance of peer influences and perceived access as risk factors for adolescent smoking are evident across the two samples.

For the California sample, we had hypothesized that both access and peer influences (having friends who smoke) would be significant risk factors for adolescent smoking. However, because systematic investigations have demonstrated the state of California's successful enforcement of its tobacco control policies [*14*] we also hypothesized that friends' smoking would be a stronger risk factor than perceived access to cigarettes. The findings from this study support our hypotheses. Similarly for the Wuhan sample, we hypothesized that both perceived access and peer influences would be significant risk factors for adolescent smoking. However, because Wuhan has been slow to implement strict enforcement of its tobacco control policies, and because the individualistic, rebellious peer norms of the youth culture seem not as salient in Wuhan as in the United States, we further hypothesized that perceived access would be a greater risk factor than having friends who smoke. For lifetime smoking, the findings from this study support our first hypothesis, that perceived access and friends' smoking are significant risk factors for adolescent smoking in Wuhan. Contrary to our second hypothesis, the findings do not support our expectation that perceived access would be a greater risk factor for adolescent smoking than peer influence. Rather, peer influence is a greater risk factor than access in Wuhan as well as in California. Despite the differences in tobacco control policy enforcement between Wuhan and California, the large and significant risk associated with friends' smoking in the two countries indicates that peer influences are a powerful risk factor for adolescent smoking in diverse cultural contexts.

The California finding that perceived access to cigarettes is a less significant risk factor for adolescent smoking than peer influence (having friends who smoke) seems consistent with the state's current tobacco control policies. Young adolescents in California who do not perceive easy access to cigarettes (i.e., who are not able to purchase cigarettes in stores) may rely more on networks of friends who have access to social resources (i.e., knowledge of people 18 years of age or older who are willing to purchase cigarettes for them)

TABLE 4

Associations between the Independent Variables and the Continuous 30-Day Smoking Measure

	California boys		California girls		Wuhan boys		Wuhan girls	
	β^a	P	β	P	β	P	β	P
Friends' smoking	0.249	0.0001	0.280	0.0001	0.348*	0.0001	0.145*	0.0001
Access to cigarettes	0.101	0.0001	0.091	0.0001	0.022	0.1658	0.031	0.0731

Note. A logarithmic transformation was used to normalize the skewed distribution of the past-30-day smoking variable.
[a] Standardized β coefficient.
* $P < 0.05$.

PM3003745796

Source: https://www.industrydocuments.ucsf.edu/docs/mqlj0001

TABLE 5

Overall Logistic Regression Model

	Lifetime smoking		Past-30-day smoking	
	OR	95% CI	OR	95% CI
Step 1: main effects				
Age	1.06	(1.01, 1.11)	1.13	(1.05, 1.21)
Wuhan (vs California)	0.96	(0.88, 1.05)	0.80	(0.71, 0.90)
Female (vs male)	0.48	(0.44, 0.52)	0.63	(0.56, 0.71)
Friends' smoking	4.81	(4.42, 5.23)	7.85	(6.86, 8.98)
Access to cigarettes	1.82	(1.67, 1.98)	1.51	(1.33, 1.72)
Step 2: interactions				
Friends' smoking × female	1.20	(1.01, 1.42)	2.11	(1.57, 2.84)
Friends' smoking × Wuhan	0.91	(0.77, 1.08)	0.94	(0.72, 1.24)
Access × female	1.49	(1.26, 1.76)	1.20	(0.92, 1.57)
Access × Wuhan	0.70	(0.59, 0.84)	0.60	(0.46, 0.78)

and other resources that can facilitate the purchase of cigarettes (i.e., false identification cards). Therefore, having friends who smoke or being part of an "adolescent smoking subculture" would emerge as even more important to the smoking ritual among teens than the perception of easy access to cigarettes.

In the Wuhan sample, the finding that perceived access to cigarettes is a less significant risk factor for adolescent smoking than friends' smoking was unexpected, given the lack of enforcement of tobacco control policies directed at youth. It is possible that we underestimated the relative importance of peer group norms in China. In comparison to the United States and other Western nations, relatively little research has been published on the importance of the peer associations during adolescence in China [*23*]. However, studies on child-rearing values in urban China [*26*] and in Hong Kong [*27*] suggest that increasing modernization and westernization may be eroding some traditional Chinese values such as filial piety that might have lessened the effect of peer influences on previous generations of Chinese youth. Evidence that younger urban Chinese are more likely to value autonomy over conformity suggests the emergence of a generation gap in some parts of China [*24*]. Perhaps peers are an important reference group for Chinese youth to negotiate the new norms and values associated with complex economic and social changes [*23*]. This could be one reason why peer influences are more strongly associated with smoking than perceived access in China.

It is not immediately clear why adolescents in California reported easier perceived access to cigarettes than did adolescents in Wuhan, because anecdotal evidence suggests that laws against cigarette sales to minors are enforced more strictly in California than in Wuhan. It is possible that the Wuhan students reported difficult access for other reasons, such as lack of spending money, lack of free time to purchase and smoke cigarettes, or lack of transportation to places that sell cigarettes. Alternatively, the connotations of words such as "easy" and "hard" may have been slightly different in the English and Chinese versions of the survey. Additional research is necessary to understand the differences in adolescents' perceived access to cigarettes in the two different countries. Young adolescents who are not able to purchase cigarettes in stores still have other options for obtaining cigarettes, such as buying or borrowing them from older peers, stealing them, or ordering them on the Internet [*14*]. Because the results of this study indicate that adolescents who do not perceive easy access to cigarettes are less likely to smoke, strict enforcement of tobacco control policies is needed to prevent adolescents from obtaining cigarettes.

The most effective school-based smoking prevention programs in the United States have used a social influences model that considers peers a very important influence on smoking behaviors [*12*]. Central to this paradigm is a focus on creating a more anti-smoking social norm within the peer group. Before applying this paradigm to a new cultural context, however, it is necessary to determine whether peers exert a similar influence on adolescent smoking in other cultures. The results of this study suggest that a social-influences paradigm that acknowledges the importance of peers to smoking behaviors may be effective in China as well. Evidence on economic development across the globe illustrates that the gradual shift away from a society's traditional values coincides with emerging values that are shaped by that society's cultural heritage [*28*]. Therefore, even though the results of this study suggest that a social-influence paradigm that addresses peers may be effective in China as well, this paradigm must be tailored to the culturally specific needs of youth in Wuhan. For example, teaching direct, assertive refusal skills may not be appropriate in a culture where refusing a cigarette offer could be viewed as an impolite act that causes the other person to lose face.

A longitudinal trial of a school-based, social-influences-based smoking prevention program is currently underway in Wuhan, China. The Wuhan Public Health and Anti-Epidemic Station and the University of Southern California have worked together to modify the specific lessons delivered in this program to fit the cultural values and logistical constraints of Chinese classrooms (e.g., large class size, lack of familiarity with small groups, and peer-led activities). Longitudinal data from this trial will provide information about the effectiveness of school-based, social-influences-based smoking prevention trials in China.

Further research is needed to assess the importance of other factors, such as family influences. For example, in some cultures, cigarettes may be offered to an adolescent by an older family member during a celebration or as a rite of passage into adulthood. Targeted curricula that identify the culturally specific role of

PM3003745797

Source: https://www.industrydocuments.ucsf.edu/docs/mqlj0001

other important social influences on smoking could increase the effectiveness of prevention programs. Further research is needed to understand the complex forces affecting adolescent smoking in Wuhan, China, as well as the best ways to utilize the social influences approach to prevent adolescent smoking.

Further research is needed to determine whether social-influences-based smoking prevention programs are as effective in industrializing socialist nations such as China as they have proven to be in industrialized capitalistic societies such as the United States. Despite the evidence that urban Chinese norms and values may be changing with increased modernization [*26, 27*], evidence exists suggesting that the newly emerging values are shaped by China's collectivist cultural heritage [*28*]. Therefore, adolescents in China may perceive especially strong pressure to conform to social norms [*29*]. Thus, prevention programs that produce anti-smoking cultural norms may be especially effective. However, the nature of social influence is complex, so more cross-cultural research is necessary before conclusions can be drawn.

Limitations

Several limitations associated with the present study must be considered. First, these results are based on cross-sectional data, so causal inferences cannot be made. Previous research suggests that affiliation with friends who smoke leads to smoking behavior, but research has also shown that adolescents who smoke tend to seek out friends who also smoke [*21*]. Second, although friends and access are significant correlates of smoking for both Wuhan and California youth, it is not clear whether similarities exist among early antecedents of smoking. Third, although validation studies using biochemical measures support the accuracy of using self-report measures to assess adolescent smoking behavior across ethnic groups in the United States [*30*], given different political contexts, it is not known whether similar findings are also true for China. Fourth, the validity of the translated measures in Chinese samples is not known. The measures used in this study were developed and validated in the United States, and then they were carefully translated into Chinese and backtranslated into English to verify accuracy of the translation. A team of bilingual researchers and public health workers (including a Chinese-born public health employee who had a degree in English linguistics from a Chinese university and also spent several years working as a research assistant for adolescent smoking prevention studies in the United States) examined the translations closely and verified that the connotations of the English and Chinese questions were as similar as possible. However, despite these extensive efforts to use equivalent measures in the two samples, we cannot rule out the possibility that students' interpretations of the questions may have differed slightly between the two cultures or that these measures might not have equivalent validity in a Chinese sample. In addition, the results of this study may have been affected by slight differences in question structure and content. For example, differing response options (qualitative vs quantitative), for questions about friends' smoking might have influenced answers. Although it is not immediately clear whether recoding can completely remedy this problem, response options were dichotomized in order to make both questions as equivalent as possible (any smoking friends vs no smoking friends).

It is possible that access to cigarettes may be a risk factor for adolescent smoking in China only under certain socioeconomic conditions. Unfortunately, this study was unable to control for socioeconomic factors. The California Education Codes did not permit the Independent Evaluation survey to assess socioeconomic status (SES) or any other measures of "family life" on an implied-consent survey. Most large-scale classroom-based adolescent surveys do not include a measure of SES because of confidentiality concerns and because SES is difficult to quantify and measure from an adolescent's point of view. In addition, even when SES measures are available, they might not be comparable across divergent cultures [*31*].

Although the California and Wuhan samples initially were selected for other studies, we were able to use these two data sets to pose additional research questions about cross-cultural similarities and differences in the antecedents of adolescent smoking. It is rare to find two large-scale adolescent smoking surveys with comparable survey items in such differing cultures. The inclusion of additional questions, as well as data from other U.S. states, other Chinese cities, and other areas throughout the world, would provide even more information about cultural variation in adolescent smoking initiation. However, because large-scale surveys of adolescent health behaviors are expensive to implement, it is useful and informative to take advantage of opportunities for secondary analysis when they occur, even if these opportunities are limited by the availability of data.

Despite these limitations, these results provide important new cross-cultural information about the correlates of adolescent smoking. The results suggest that friends' smoking is strongly associated with adolescent smoking across the two cultures. Access to cigarettes, in contrast, may be a risk factor for adolescent smoking only under certain cultural or socioeconomic conditions. An improved understanding of how culture shapes peer influence on adolescent smoking in China is necessary to develop the most effective prevention programs.

PM3003745798

Source: https://www.industrydocuments.ucsf.edu/docs/mqlj0001

REFERENCES

1. Cheng TO. Teenage smoking in China. J Adolesc 1999;22:607–20.
2. Dean J. Smoke and mirrors: tobacco market for smuggled foreign brand cigarettes. Far Eastern Econ Rev 1998;161:62.
3. Yang G, Fan L, Tan J, et al. Smoking in China: findings of the 1996 National Prevalence Survey. JAMA 1999;282;1247–53.
4. Guang-ren L. An investigation of adolescent health from China. J Adolesc Health 1997;20:306–8.
5. Li X, Fang X, Stranton B. Cigarette smoking among Chinese adolescents and its association with demographic characteristics, social activities, and problem behaviors. Substance Use Misuse 1996;31:545–63.
6. Sun W, Ling T. Smoking behavior among adolescents in the city, suburbs, and rural areas of Shanghai. Am J Health Promo 1997; 11:331–6.
7. Zhu B, Liu M, Wang S, et al. Cigarette smoking among junior high school students in Beijing, China, 1988. Int J Epidemiol 1992;21:854–61.
8. Zhu B, Liu M, Wang S, et al. Cigarette smoking among junior high school students in Beijing. Am J Public Health 1996;86: 368–75.
9. Center for Disease Control and Prevention. Youth tobacco surveillance—United States. MMWR Surveill Summaries 2000 1999;49:1–93.
10. Sussman S, Dent C, Burton D, Stacy A, Flay B. Developing school-based tobacco use prevention and cessation programs. Thousand Oaks: Sage, 1995.
11. The World Health Organization. World Health Report 1999. Combating the tobacco epidemic. Geneva, Switzerland: World Health Organization, 1999.
12. Unger JB, Li Y, Chen X, Xia J, Azen S, Guo Q, Tan S, Gong J, Sun P, Liu C, Chou C, Zheng H. Adolescent smoking in Wuhan, China: baseline data from the Wuhan smoking prevention trial. Am J Prev Med 2001;21(3):162–9.
13. Lantz PM, Jacobson PD, Warner KE, et al. Investing in youth tobacco control: a review of smoking prevention and control strategies. Tobacco Control 2000;9:47–63.
14. Independent Evaluation Consortium. Final report of the independent evaluation of the California Tobacco Control Prevention Education Program: Wave 1 data, 1996–1997. Rockville (MD): The Gallup Organization, 1998.
15. Independent Evaluation Consortium. Interim Report. Independent evaluation of the California Tobacco Control Prevention and Education Program: Wave 2 data 1998; Wave 1 and Wave 2 Comparisons, 1996–1998. Rockville (MD): The Gallup Organization, 1998.
16. U.S. Department of Health and Human Services. Reducing tobacco use: a report of the Surgeon General. Atlanta (GA): Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2000.
17. Centers for Disease Control and Prevention. State and sex specific prevalence of behavioral risk factor surveillance system 1994 & 1995. MMWR 1997;1997:SS-3.
18. Conrad KM, Flay BR, Hill D. Why children start smoking cigarettes: predictors of onset. Br J Addict 1992;87:1711–24.
19. Flay BR, Hu FB, Siddiqui O, Day LE. Differential influence of parental smoking and friends' smoking on adolescent initiation and escalation of smoking. J Health Soc Behav 1994;35:248–65.
20. Wang M, Fitzhugh E, Westerfield RC, Eddy JM. Social influences on adolescents' smoking progress: an age trend. J Adolesc Health 1995;16:200–3.
21. Wang MQ, Eddy JM, Fitzhugh EC. Smoking acquisition: peer influence and self-selection. Psychol Rep 2000;86:1241–6.
22. Crockett LJ. Cultural, historical, and subcultural contexts of adolescence: implications for health and development. In: Schulenberg J, Maggs J, Hurrelman K, editors. Health risks and developmental transitions during adolescence. New York: Cambridge Univ. Press, 1997:23–53.
23. Ngai N-P. China's youth work in rural areas: some reflections on a town and two villages. Int Soc Work 1997;40:27–42.
24. Frederick E, Handle G. The child and society: the process of socialization. New York: Random House, 1972.
25. Harris JR. Where is the child's environment? A group socialization theory of development. Psychol Rev 1995;102:458–89.
26. Xiao H. Structure of child-rearing values in urban China. Sociol Perspect 2000;43:457–71.
27. Shek D, Chan LK. Hong Kong Chinese parents' perceptions of the ideal child. J Psychol 1999;133:291–302.
28. Inglehart R, Baker WE. Modernization, cultural change and the persistence of traditional values. Am Sociol Rev 2000;65:19–51.
29. Triandis H. Individualism & collectivism. Boulder (CO): Westview Press, 1995.
30. Willis TA, Cleary SD. The validity of self-reports of smoking: analyses by race/ethnicity in a school sample(of urban adolescents. Am J Public Health 1997;87:56–61.
31. Karim MB. Measuring socio-economic status of rural households in third world countries: the case of Bangladesh. Int J Contemp Sociol 1990;27:3–4.

PM3003745799

Source: https://www.industrydocuments.ucsf.edu/docs/mqlj0001